

CLAIMS:

1. A network relaying apparatus connecting a plurality of networks for outputting the packets input from said networks, to the next transfer destination based on the route information, comprising:

at least a network interface connected to the networks for controlling the interface with the networks;

at least a routing processor connected to one or a plurality of said network interfaces for routing the packets input from said network interfaces;

a routing manager for managing the internal components of the system; and

a connector for connecting said routing manager and each of a plurality of said routing processors;

wherein said routing processors each include:  
a packet buffer for storing an input packet;  
a high-speed readable and writable header memory accessible asynchronously with said packet buffer and adapted for storing the header information including the header and the internal header of the input packet;

a route table for storing the route information including an internet protocol (IP) address of the next router corresponding to the destination IP address;

an address search table for storing a media access control MAC address of the next router corresponding to the IP address of the next router;

a flow search table for storing the action corresponding to the reference conditions including the IP headers of the source and the destination;

a transfer engine for performing a receiving process for storing an input packet received from a network or the connector in said packet buffer, adding the internal header to the packet header and storing the resulting header information in said header memory, and a transmission process for reading the input packet from said packet buffer, producing an output packet from the input packet stored in said packet buffer and the header information stored in said header memory, and outputting said output packet to said connector or said network; and

a search engine for performing an input search process for searching the transfer destination information with reference to said route table based on the header information stored in said header memory, and an output search process for searching the MAC address of the next router with reference to the address search table based on the IP address of the next router determined in said input search process and searching various action including QoS with reference to a flow search table.

2. A network relaying apparatus according to Claim 1,

wherein said transfer engine, in the receiving process, stores the input packet in said packet buffer

and stores in said header memory the header information with the internal header including the input/output port number and the QoS control information added to the MAC header and the IP header of the input packet;

wherein said search engine, in the input search process, extracts the destination IP address in the IP header from the header information stored in said head memory by said transfer engine, and with reference to said route table based on said destination IP address, searches the transfer destination information including the IP address of the next router;

wherein said search engine, in the output search process, extracts the IP address of the next router determined in said input search process, searches the MAC address of the next router with reference to the address search table based on said IP address, searches the action information including the QoS based on the reference conditions including the transfer destination information and the destination information with reference to the flow search table, and stores said searched transfer control information in said header memory; and

wherein said transfer engine, in the transmission process, produces an output packet from the input packet stored in said packet buffer and the header information stored in said header memory based on the transfer control information searched in the output search process of said search engine, and outputs the

output packet to said connector or said network interface.

3. A network relaying apparatus according to Claim 1,

wherein said route table, said address search table and said flow search table are configured of separate storage circuits so that the read or write operation can be performed independently of each other; and

wherein said receiving process, said input search process, said output search process and said transmission process are executed by pipelining control using separate tables.

4. A network relaying method for outputting the packets input from the networks, to a transfer destination in a network relaying apparatus comprising at least a network interface connected to the networks, at least a routing processor for routing the packet input from said network interface, a routing manager for managing the internal parts of the system, and a connector for connecting said routing manager and each of a plurality of said routing processors, comprising:

a receiving process for storing the input packet, and storing the header information separately from the input packet by adding the internal header including the input and output port numbers and the QoS control information to the MAC header and the IP header of the input packet;

an input search process for extracting the destination IP address in the IP header from the header information stored by said receiving process, and searching the transfer destination information including the IP address of the next router based on said destination IP address;

an output search process for extracting the IP address of the next router determined by said input search process, searching the MAC address of the next router based on said IP address, searching the action information including the QoS based on the reference conditions including the transfer destination information and the destination information, and storing the searched transfer destination information and the action information in the header information; and

a transmission process for producing an output packet based on the input packet and the header information and outputting the output packet to said connector or said network interface.

5. A network relaying method according to Claim 4,

wherein said receiving process, said input search process, said output search process and said transmission process are executed by pipelining control.